CLAIMS

What is claimed is:

1. A device for irradiating tissue, comprising:

a fluorescent element positioned to receive pump radiation and responsively generate emitted radiation, the emitted radiation having substantially different spectral characteristics with respect to the incident radiation; and

a redirector for redirecting at least a portion of the emitted radiation toward a tissue target.

2. The device of claim 1, wherein the fluorescent element comprises a fluorescent substance dispersed in a solid medium.

3. The device of claim 2, wherein the fluorescent substance includes fluorescent ions, and the solid medium is selected from a group consisting of a solid-state crystal and a glass.

4. The device of claim 2, wherein the fluorescent substance includes a fluorescent dye, and the solid medium is selected from a group consisting of a polymer and a glass.

5. The device of claim 4, wherein the solid medium comprises a polymer selected from a group consisting of polymethyl methacrylate (PMMA) and polyvinyl toluene (PVT).

6. The device of claim 1, wherein the fluorescent element comprises a liquid fluorescent dye solution.

7. The device of claim 6, wherein the dye solution is static.

8. The device of claim 6, wherein the dye solution is continuously pumped through the fluorescent element.

9. The device of claim 1, wherein the redirector comprises a diffuse reflector.

10. The device of claim 9, wherein the diffuse reflector has a frustro-conical shape.

11. The device of claim 1, wherein the pump radiation is generated by a frequency-doubled solid-state laser.

12. The device of claim 1, wherein the pump radiation is delivered to the fluorescent element through an optical fiber.

13. The device of claim 1, wherein the pump radiation is delivered to the fluorescent element through an articulated arm.

14. The device of claim 1, wherein the redirector comprises a reflective coating configured to reflect the emitted radiation, the reflective coating being substantially transparent with respect to the pump radiation.

15. The device of claim 1, further comprising a substantially transparent window having a proximal face positioned adjacent to the fluorescent element and a distal face for contacting the target.

16. The device of claim 15, further comprising means for cooling the window.

17. The device of claim 1, wherein the redirector comprises a waveguide including a reflective entrance face

and reflective walls, the entrance face having a substantially transmissive aperture formed therein for admitting pump radiation into the waveguide.

18. The device of claim 17, wherein the reflective walls comprise a boundary between a waveguide core having a relatively high index of refraction and a cladding material having a relatively low index of refraction, the boundary causing total internal reflection of a portion of the emitted radiation.

19. The device of claim 17, wherein the reflective walls comprise a reflective coating.

20. The device of claim 17, wherein the reflective walls comprise a metallic coating.

21. The device of claim 17, wherein the reflective walls comprise a dielectric coating.

22. A method for irradiating tissue, comprising the steps of:

directing pump radiation onto a fluorescent element;

responsively generating emitted radiation at the fluorescent element, the emitted radiation having spectral characteristics substantially different from the incident radiation;

receiving a portion of the emitted radiation at a redirector; and

redirecting the received portion of the emitted radiation toward a tissue target.

23. The method of claim 22, wherein the step of directing incident radiation onto the fluorescent element includes directing incident radiation through an optical fiber.

24. The method of claim 22, wherein the step of redirecting the emitted radiation includes reflecting the emitted radiation from a diffuse reflector.

25. The method of claim 22, wherein the step of redirecting the emitted radiation includes reflecting the emitted radiation from a reflective coating, the reflective coating being substantially transparent with respect to the pump radiation.

26. The method of claim 22, wherein the step of redirecting the emitted radiation includes reflecting the emitted radiation from the boundary between a waveguide core and cladding material, the cladding material having a substantially lower index of refraction than the waveguide core.

27. The method of claim 22, wherein the tissue target comprises a vascular lesion.

28. The method of claim 22, wherein the tissue target comprises a tumor.

29. The method of claim 22, wherein the tissue target comprises hair.

30. The method of claim 22, wherein the tissue target comprises a pigmented lesion.

31. The method of claim 22, further comprising the steps of cooling the tissue target.

32. The method of claim 31, wherein the step of cooling the tissue target comprises:

providing a substantially transparent and thermally conductive window;

placing a face of the window in thermal contact with the tissue target; and

cooling the window.

33. A system for irradiating tissue, comprising:

a pump radiation source for generating pump radiation;

a fluorescent element positioned to receive the pump radiation and responsively generate emitted radiation, the emitted radiation having substantially different spectral characteristics with respect to the incident radiation; and

a redirector for redirecting at least a portion of the emitted radiation toward a tissue target.

Sub B5

Add A4

Claims 1 & 33 are same. device Vs System.